International Journal of Biomedical Research

ISSN: 0976-9633 (Online)
Journal DOI:10.7439/ijbr
CODEN:IJBRFA

Research Article

Case based learning: an innovative student-centred methodology for teaching biochemistry

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Abstract

Background: The knowledge of biochemistry is extremely necessary for a medical student to understand basic functions of the human body. The teaching of biochemistry in medical college is mostly focused on the chemical structure and metabolism of biomolecules. Traditionally in most of the medical colleges of India, entire syllabus of biochemistry is completed through didactic lectures and practical sessions. In case of lecture the role of learners is passive and there is less or no interaction of the student with teacher. Case based learning is one of the innovative teaching-learning methodology.

Objective: The present study was conducted with an aim to determine the perception of students to various aspects of Case based learning.

Material and method: The modules prepared for Case based learning session were based on the common medical problems. For each module three sessions were conducted. At the end of session the perception of students regarding Case based learning as enhancing learning was assessed by close ended questionnaire obtained from each participant.

Results: Majority of students felt that Case based learning is more useful in understanding the concept of biochemistry as compared to didactic lecture. . 98.4% of students perceived that Case based learning module was useful in independent learning and developing communication skills. The role of facilitator in Case based learning session was reported to be important by 99.2% participants.

Conclusion: From our study it can be concluded that Case based learning can be used as innovative teaching method for increased retention of knowledge, better application of biochemistry in medicine.

Keywords: Case based learning, didactic lectures, module, teaching-learning methodology

1. Introduction

The main aim of medical education is to help students to acquire knowledge, develop attitudes and achieve clinical skills therefore, teaching methodology is very essential to cultivate a good learning experience. Learning results from individual's own experience based upon interaction with the environment.

Biochemistry, Anatomy and Physiology are basic medical science subjects which are introduced along with community medicine in the first year curriculum of Bachelor of Medicine and Bachelor of Surgery (MBBS) course.[1] Biochemistry is the study of structure and function of living things at molecular level. The knowledge of biochemistry is necessary to understand basic functions of the human body.[2]

Diseases are manifestations of abnormalities of biochemical molecules and processes, hence all diseases have biochemical basis. Medicine practice is highly dependent on the laboratory analysis of body fluids hence the knowledge of biochemistry is important for diagnosis, prognosis and treatment of disease.[3] Therefore teaching of biochemistry for students of medicine should be directed towards application in clinical practice.

Traditionally in most of the medical colleges of India, entire syllabus of biochemistry is completed through didactic lectures and practical sessions. In case of lecture the role of learners is passive and there is less or no interaction of the student with teacher. Recently various innovative teaching methods like interactive lecturing, problem based learning (PBL) and case based learning (CBL) are adopted by many medical institutes to enhance the understanding of subject.[4]

CBL is a pedagogical method that uses case studies as active learning tools.[1] It aims to develop reasoning skills based on clinical case scenarios which allows medical student to learn the basic medical science subjects in context of a medical problem.[5] The present study was conducted with an aim to determine the perceptions of students to various aspects of CBL.

2. Material and Method

The present study was conducted in a batch of 125 first year MBBS students of Rural Medical College of Pravara Institute of Medical Sciences (Deemed University), Loni. The study was approved by Institutional Ethics Committee.

Participating students were introduced and oriented to the concept of CBL. All the participants were included in test group and no control group was formed. All students willingly participated in the present study and informed written consent was obtained from each of them.

For CBL session the 125 students were divided in groups. The participants were made to sit in a circle so as to maintain the eye to eye contact of participants. Each group was assigned to a facilitator whose role was not to lead the group but keep the discussion on the right track. The facilitator also ensured the active participation of each member in the group.

The modules prepared for CBL session were brief, qualitatively formulated and framed and were based on the common medical problems like diabetes mellitus. Two case scenario used in the present study is shown in figure 1. For each module three sessions were conducted. In the first session of CBL, a clinical based question was given to the participants and they were briefly oriented with the clinical case. This was followed by second session after five days where the discussion on the biochemical basis of the given clinical case was done. In the third session the doubts of the participants were cleared by facilitator.

At the end of session the perception of students regarding CBL as enhancing learning method was assessed by close ended questionnaire obtained from each participating student. The response for each question regarding CBL was measured in terms of agreed, disagreed or neutral response.

Figure 1: Case based modules

Case -1

A 68 years old male was brought to the casualty in semiconscious state. Following are the biochemical findings.
Random Blood Glucose Level-520mg%.
Blood Urea Level-40mg%.
Blood pH 6.8.
Catheterised urine sample showed presence of ketone bodies.
1) Name the disorder.
2) Name the ketone bodies.
3) Explain the biochemical basis of this disorder.

Case -2

A Four years old boy was brought to hospital by parents. He is having generalized edema. His laboratory Investigation reports are as follows
Serum cholesterol 380mg%.
Serum Total proteins 4gm%.
Serum Albumin 1.8gm%.
Serum Globulin 2.2gm%
Blood Urea 60mg%
Serum Creatinine 2.1mg%
Urine Albumin+++
Urine Sugar –Nil
1) What will be your diagnosis?
2) What are the causes of Edema?
3) Explain the biochemical basis of increase in serum Cholesterol level.

3. Results

The response of the students to the CBL session is shown in Table 1. A total of 112 (89.6%) students agreed that CBL sessions are more useful in understanding the concept of biochemistry as compared to didactic lecture. 89 (71.2%) participants suggested that CBL can be conducted along with lectures.

Most of the participating students suggested that CBL module is helpful in development of critical thinking and can be recommended for future batches. 98.4% of students perceived that CBL module was useful in self directed learning and developing communication skills. A total of 96.8% expressed view that CBL is very useful in clearing the concept of the particular topic which is not cleared during routine theory classes and therefore CBL will help them to perform better in formative as well as summative examinations.

The role of facilitator in CBL session was reported to be important by 99.2% participants. Majority of the students enjoyed CBL sessions as it was very interactive and allowed them to participate actively in learning process which is not possible in didactic lectures. The clinical co-relation of biochemistry in CBL was appreciated by majority of students.

Table 1: Students' response to case based learning

Q. No	Question	Agreed (%)	Neutral Response (%)	Disagreed (%)
1.	CBL is more useful in understanding particular topic as compared to didactic lecture.	112 (89.6)	04 (3.2)	09 (7.2)
2.	CBL can be conducted along with lectures.	89 (71.2)	00	36 (28.8)
3.	Clinical scenario given in CBL was interesting.	121 (96.8)	01(0.8)	03 (2.4)
4.	CBL session was interactive.	116 (92.8)	03 (2.4)	06 (4.8)
5.	CBL module is helpful in development of critical thinking.	117 (93.6)	04 (3.2)	04 (3.2)
6.	CBL is important for independent learning and developing communication skills.	123 (98.4)	00	02 (1.6)
7.	Role of facilitator in CBL is important.	124 (99.2)	01 (0.8)	00
8.	CBL can be recommended for future batches	119 (95.2)	00	06 (4.8)
9.	CBL will be help to perform better in formative as well as summative examinations.	121 (96.8)	01 (0.8%)	03 (2.4)
10.	CBL is useful in terms of future application of knowledge in medicine.	116 (92.8)	04 (3.2)	05 (4)

4. Discussion

The use of various innovative teaching methods for imparting undergraduate medical education appears to improve the teaching-learning process for both the teacher as well as for the students. In the traditional didactic lectures stress is given on teaching alone, so it puts the learner on the passive role.

In the present study, the feedback given by the participants clearly indicate that CBL enchances the development of lateral thinking and clinical co-relation. The teaching of biochemistry in medical college is mostly focused on the chemical structure and metabolism of

biomolecules.[6] The clinical aspect and relevance of these biomolecules are seldom discussed. Therefore the knowledge gained by this traditional method is hardly retained till the clinical teaching starts in the later years. The use of innovative teaching-learning methodology involving CBL can help the students to understand the molecular basis of life in health and disease. Academicians like Surapaneni [1] reported CBL methodology to be a valuable tool in biochemistry. The implementation of CBL in medical education will prepare students as competent primary care physicians.

CBL, an innovative method also promotes active participation of the students in learning biochemistry in the context of clinical case and in the development of case analyzing and it also improves diagnostic skills rather than mugging up or memorization.[1]
CBL provokes interest in the subject and helps in deep and strategic learning.[7] The vast scope of interaction and active role of each participant makes CBL more meaningful. Most of the students appreciated this aspect of CBL. This observation is similar to that of Meyer *et al*.[6] Interactive sessions make students curious, attentive and active participants.[8]

In the present study, most of the students expressed significance of CBL in strengthening the clinical concept and also it helped clearing the concept of the particular topic which is not cleared during routine theory classes. This observation is similar to that of Singh *et al*. CBL sessions enable the students to acquire communication skills.

5. Conclusion

From the present study it can be concluded that CBL can be used as innovative teaching method for increased retention of knowledge, better application of biochemistry in medicine. CBL can enhance the development of learning skills and can be for early clinical exposure. This innovative teaching-learning methodology is student centered and achieves greater learner satisfaction.

References

1. Surapanemi KM. The effect of integrated teaching with case based learning (CBL) in the biochemistry of undergraduate medical curriculum. *Journal of Clinical and Diagnostic Research*, 2010; 5:3058-3063.
2. Vasudevan DM, Sreekumari S. Texbook of Biochemistry (for Medical students).4th edn. Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
3. Rafi. Principles and applications of Biochemistry in Medicine. A textbook of biochemistry for medicos and Doctors. Pathfinder Medical Publishers. Hyderabad, India.
4. Singh PR, Bhatt R. Introduction of case based learning for teaching anatomy in a conventional medical school. *J Anat Soc India*, 2011; 60:232-235.
5. Norman GR, Schmidt HG. Effectiveness of problem-based learning curricula: theory, practice and paper darts. *Medical Education*, 2000; 34:729-738.
6. Meyers C, Jones TB. Case studies, In: Promoting active learning: Strategies for the College Classroom. San Francisco, CA: Jossey-Bass, 1993; p.103-119.
7. Adiga U, Adiga S. Case based learning in biochemistry. *International Journal of Pharma and Biosciences*. 2011; 2: 332-336.
8. Margetson D. Beginning with the essentials: why problem based learning begins with problems. *Education for health*. 1996; 9:61-69.